

# SDSS-II: Outreach and Broader Impact

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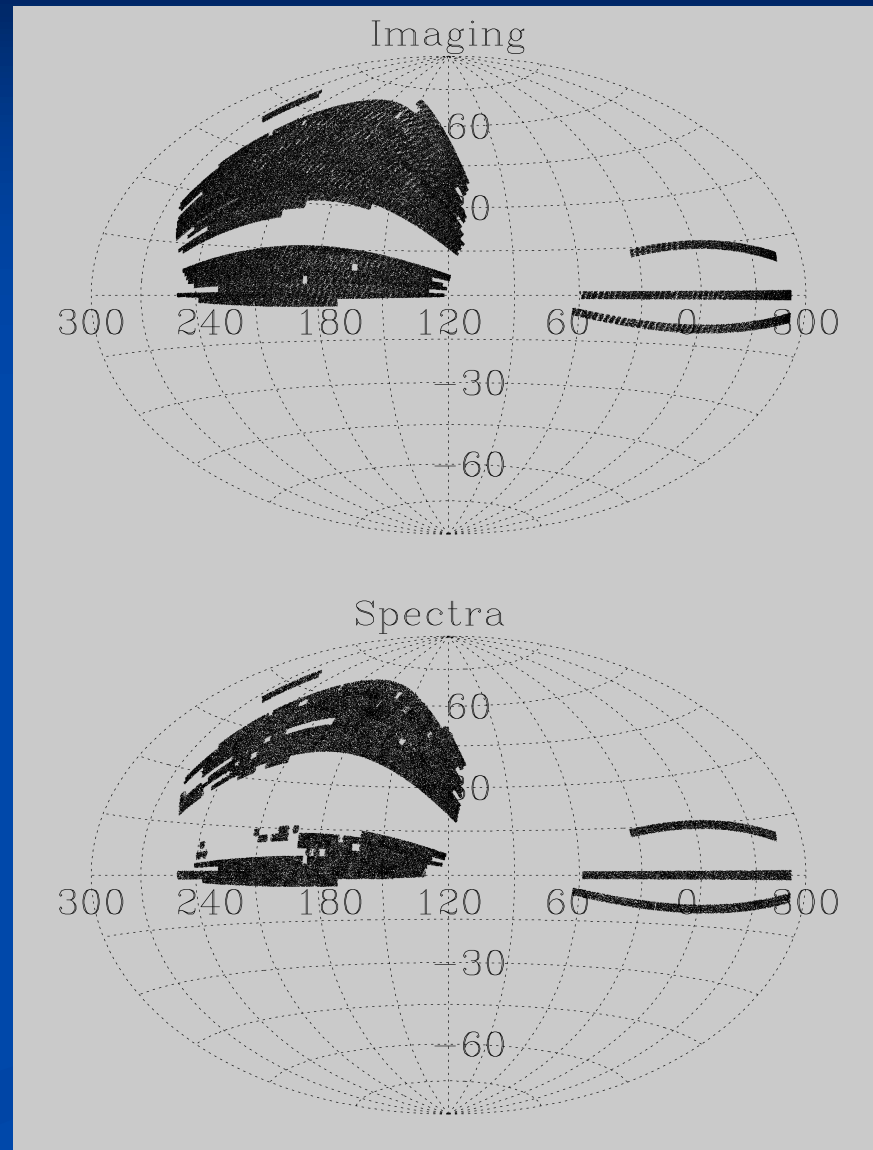
- SDSS' impact on the astronomical community
- SDSS' impact on the general public
- Involving external people in SDSS collaboration
- Ease of use of SDSS databases

# SDSS and the Astronomical Community

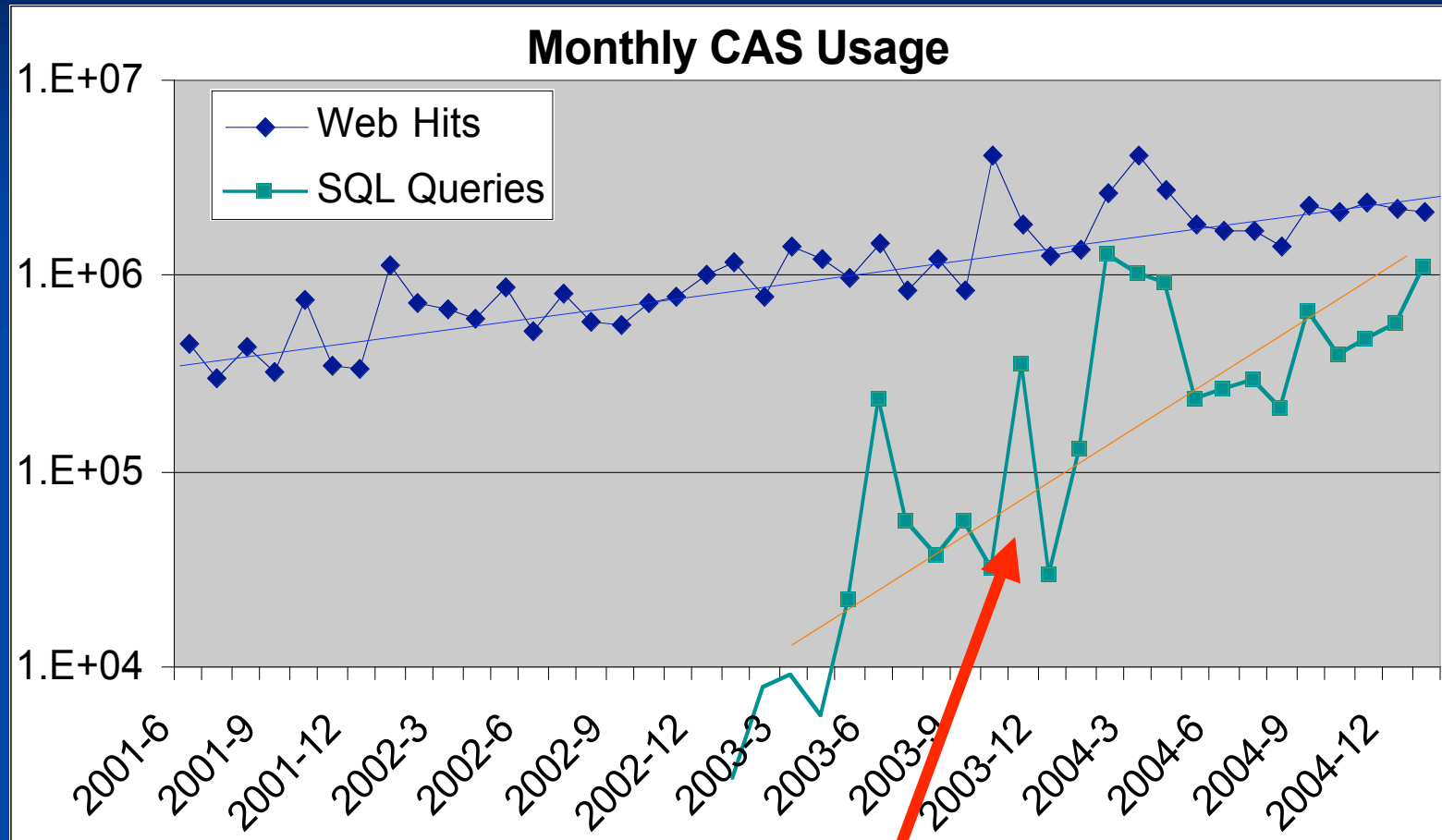
- SDSS data have been distributed to the community in a series of public data releases, roughly one per year.
- The most recent (DR3, in September 2004) contains 528,640 spectra and detailed photometry for 141 million objects over 5282 square degrees.

Sky coverage of DR4,  
to be released in  
June (on schedule)

We will continue  
releasing all  
survey-quality data  
through the end of  
SDSS-II (through  
DR8!).

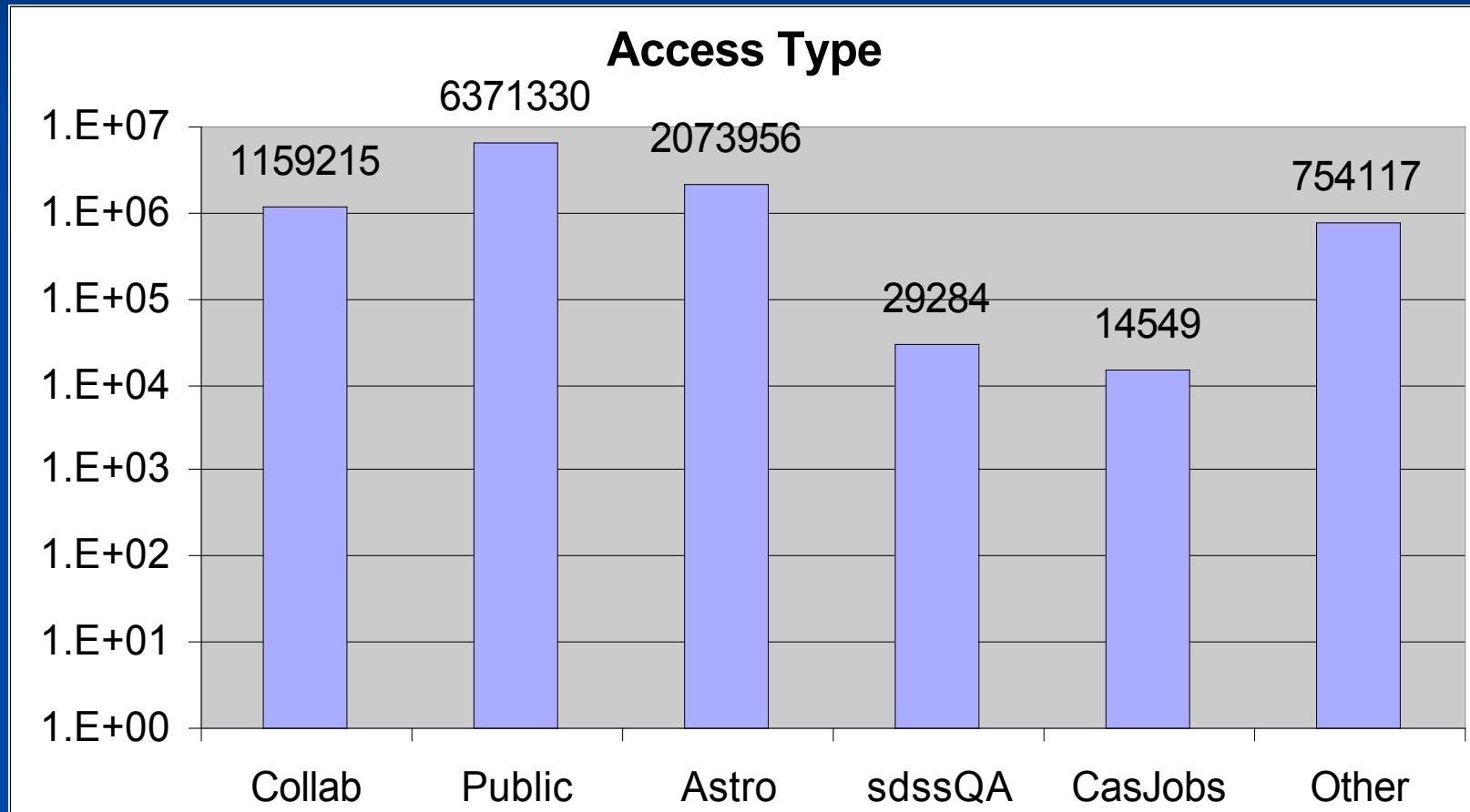


# Usage of the Catalog Archive Server with time



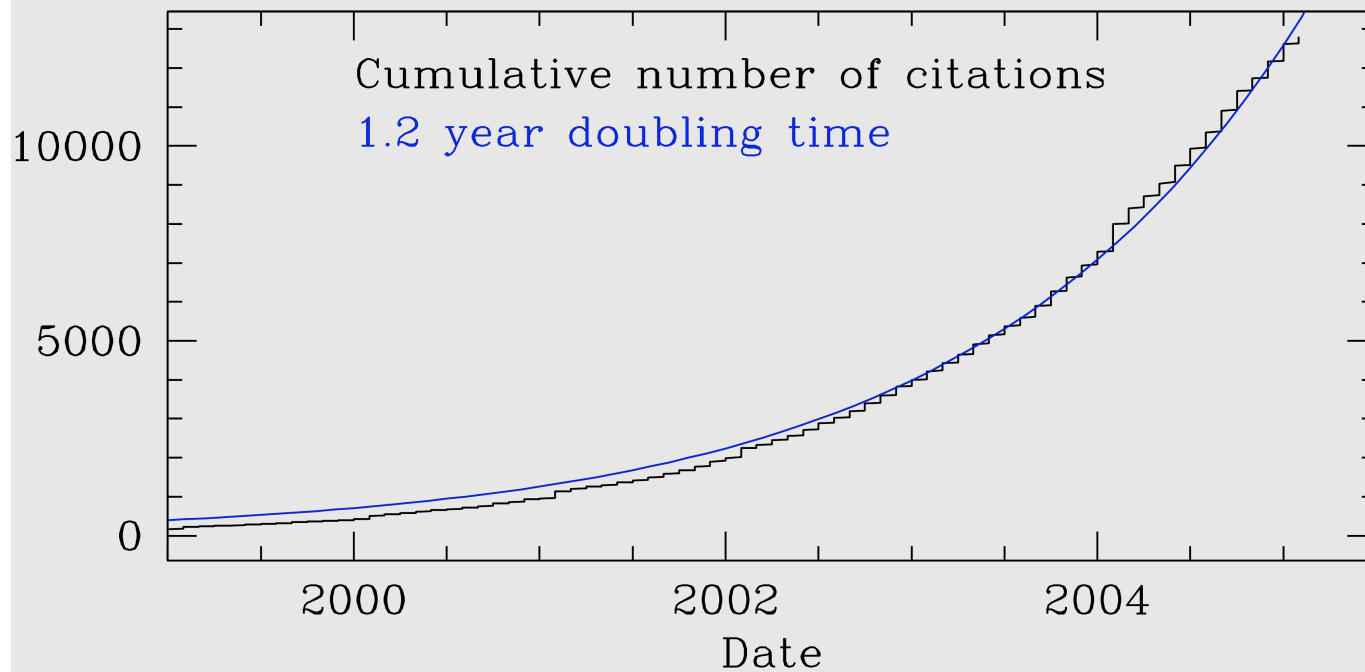
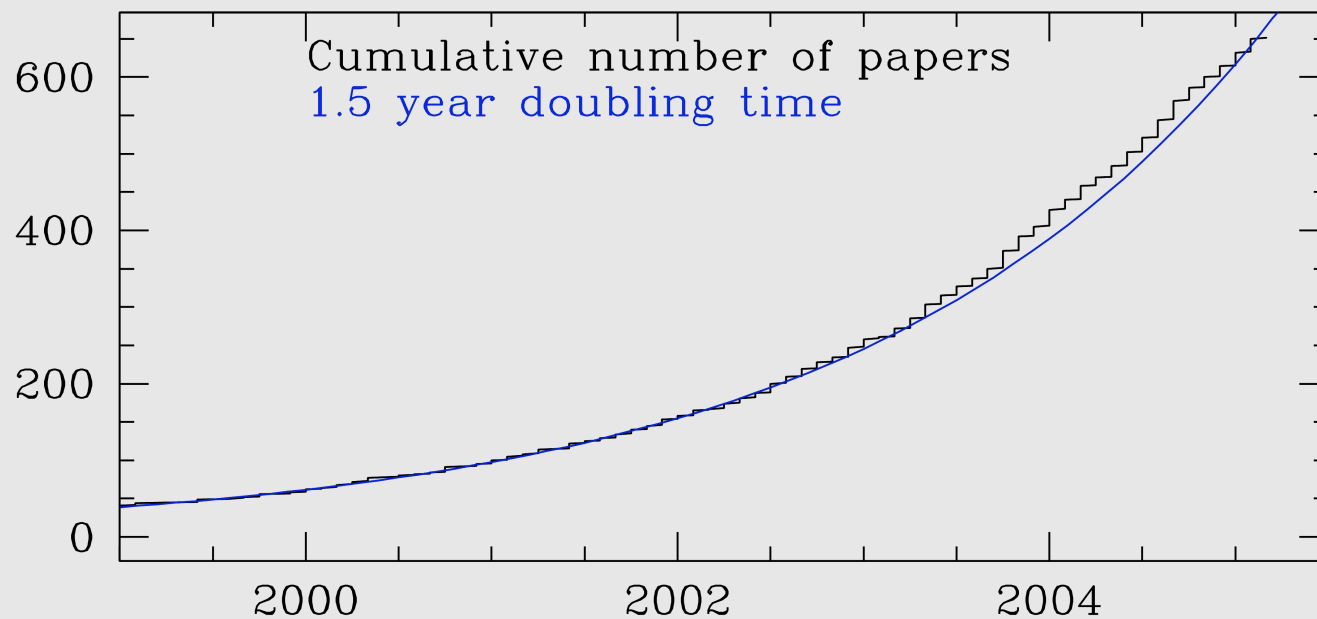
SQL (sophisticated queries) usage increasing rapidly!

## Number of web hits from various sources



- There have been 660 refereed papers published to date that mention SDSS in the title or abstract.
- The most recent AAS meeting alone included 85 abstracts based on SDSS.
- SDSS papers received 40 citations per 2001 paper, more than any other facility on the ground or in space (Trimble et al.). Keck was second, with 21 citations per paper.
- In the last year, over half of the 213 SDSS papers published were by astronomers outside the collaboration.

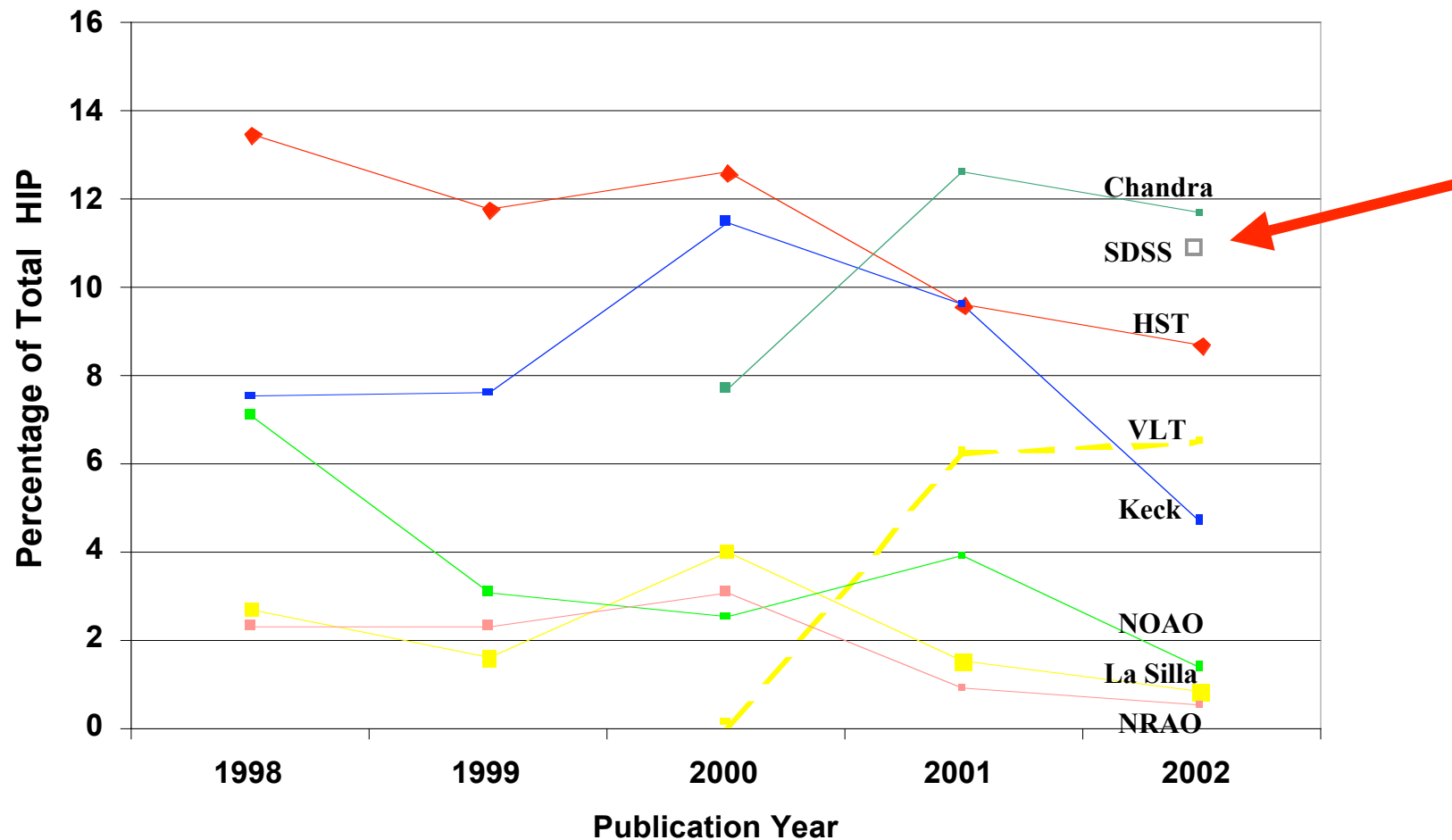
## Refereed SDSS Papers



(Based on an  
ADS query for  
papers that  
mention SDSS in  
abstract or title).

Citation impact of SDSS papers in 2002 is comparable to that of Chandra; higher than HST, Keck.

### FACILITIES CONTRIBUTING TO HIGH IMPACT PAPERS\*



*Courtesy of Bob Williams, STScI*

*\*Most cited 200 papers*



## *SDSS and other telescopes*

- SDSS is the default optical comparison dataset for GALEX, Spitzer: 8 / 30 GALEX ApJL special issue papers make use of SDSS data.
- SDSS filter set is used by ACS on Hubble, Gemini, etc. Existence of SDSS calibrated photometry gives a dense grid to calibrate images taken on any of the larger telescopes. (e.g., used by Tonry et al. 2003 to calibrate high- $z$  SN photometry on Keck, VLT, HST, etc.)
- SDSS-II, with larger sky coverage and improved calibration, will strengthen this advantage.

- SDSS data is forming the basis of major programs being carried out on MMT (Hectospec), AAT (85 nights!), UKIRT and Spitzer (brown dwarfs), HST (118 orbits for damped Ly alpha lines), etc.
- SDSS is the standard optical dataset for reference to existing and planned wide-field surveys in other bands, such as FIRST (20 cm) and UKIDSS (near-IR).
- SDSS software being used for major surveys such as DEIMOS / DEEP on Keck.

## “Imitation is the sincerest form of flattery”

- SDSS is being used as a model for the next generation of sky surveys: filter choices, software decisions, data distribution, science drivers, collaboration design, etc:
  - Pan-STARRS
  - LSST
  - Dark Energy Survey
  - SALT Drift-Scan Survey
- SDSS data are NVO-compliant, and are among the first substantial data set included in the NVO itself. Helped tremendously by SDSS' superb astrometry.

# SDSS and Students

- There were 20 PhD. theses based on SDSS data completed within the collaboration in the last year. Another 44 theses in progress. From 16 US institutions, and 8 overseas.
- 55 further graduate students, and 51 undergraduates are carrying out SDSS research.
- SDSS students and postdocs have gone on to some of the top jobs in the country (6 Hubble and Spitzer Fellows; faculty positions at Santa Cruz, Arizona, Washington, LBL, Pennsylvania, Portsmouth, York, RPI, MIT, etc...)



Jim Gunn (SDSS Project Scientist) has won four major awards in the last few years, all of which cite the SDSS explicitly:

- R.M. Petrie Prize, 2001 (Canadian Astronomical Society)
- First Joseph Weber Prize for Instrumentation, 2002 (AAS)
- Henry Norris Russell Lectureship, 2005 (AAS)
- Crafoord Prize, 2005 (Royal Swedish Academy of Sciences)

# SDSS and the Public

- There is a public version of the CAS (SkyServer) which is getting almost twice the hits from professionals.
- This public version includes extensive educational materials.
- SDSS results get frequent writeups in New York Times, Sky & Telescope, Science News, etc. The general public is familiar with the survey.

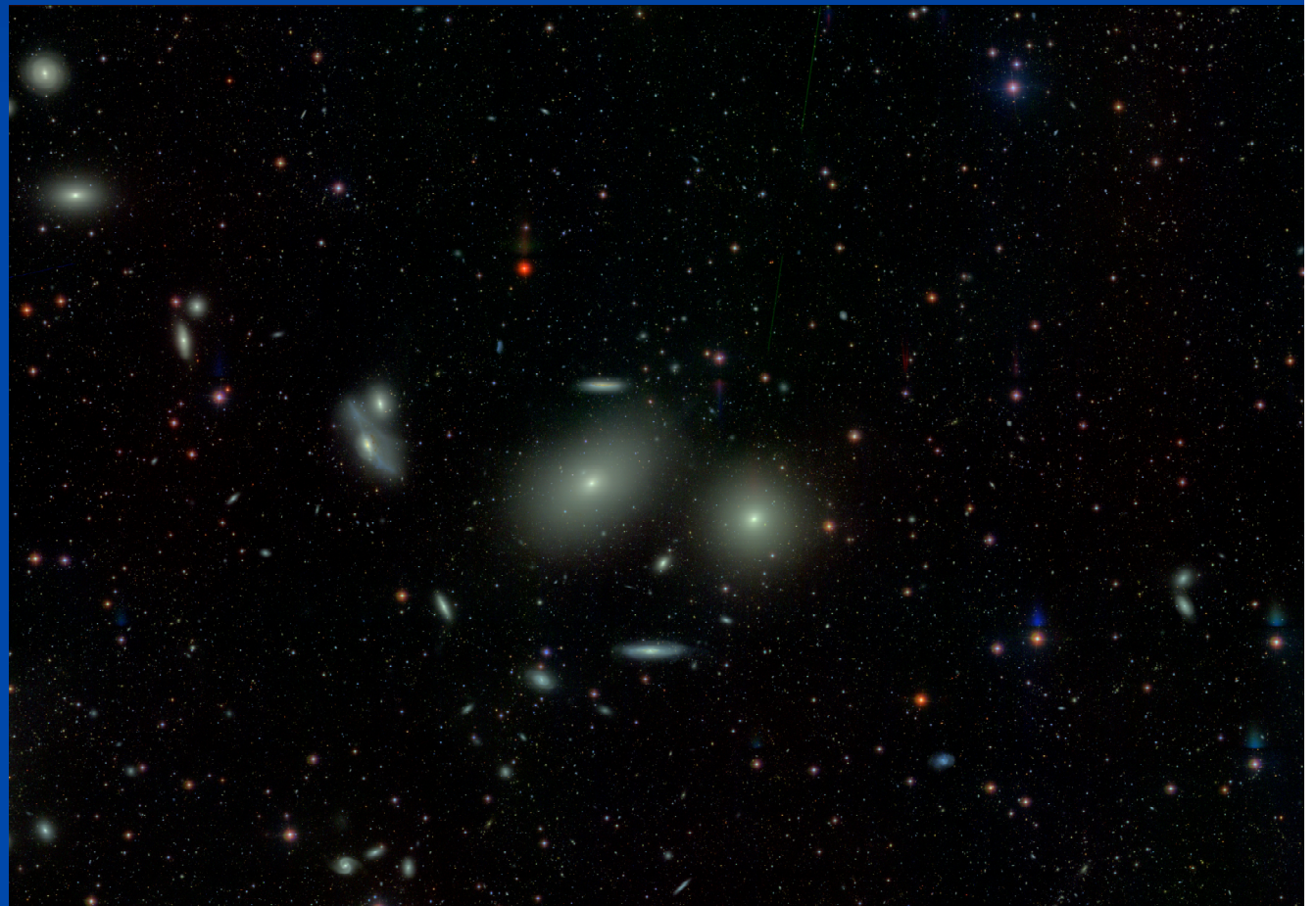
- The American Museum of Natural History is joining SDSS-II. It plans to incorporate SDSS and SDSS-II data into all aspects of its programs:
  - Astrobuletin (cross-media packages distributed nationwide)
  - Digital map of the Milky Way.
  - Fly-throughs of SDSS data
  - Space Show for Hayden Planetarium and beyond.





- Griffith Observatory is planning a 152 ft by 20 ft display of the SDSS scan through Virgo ( $30 \text{ deg}^2$ ), filling up one wall of their renovated exhibit space. A million dollar investment!

(A tiny fraction of the scan)





## Q. 7: Involvement of astronomers outside the SDSS Collaboration

- We have a program of *external collaborators*, who bring expertise, followup telescopic resources, to SDSS scientific projects. In 2004, we had 45 such collaborators approved. They were lead authors on ~15% of SDSS collaboration papers in 2004 (including most highly-cited paper of the year).
- Students and postdocs who leave SDSS institutions are allowed to complete SDSS projects and continue their science.
- A small number of external scientists are named *external participants*, and are given full data rights, for their contribution to SDSS infrastructure (e.g., Connie Rockosi from Santa Cruz!).

## Q 8. Ease of use of database interface

The best way for new users to learn about, and get access to the data is via the public data release website:

<http://www.sdss.org/dr3>

This includes detailed explication of the data themselves, and the many interfaces to it.

# <http://www.sdss.org/dr3>



**SDSS Data Release 3**  
Sloan Digital Sky Survey

**Where to Start**  
[News and Updates](#)  
[Tutorials](#)  
[Data Products](#)  
[Data Access](#)  
[Sky Coverage](#)  
[Instruments](#)  
[Data Flow](#)  
[Algorithms](#)  
[Glossary](#)  
[Known Problems](#)  
[Help and Feedback](#)  
[Search](#)

The Sloan Digital Sky Survey (see [www.sdss.org](http://www.sdss.org) for general information) will map one-quarter of the entire sky and perform a redshift survey of galaxies, quasars and stars. The DR3 is the third major data release and provides [images](#), [imaging catalogs](#), [spectra](#), and [redshifts](#) for download.



[About DR3](#) explains what is new in DR3, and lists remaining or new caveats and subtleties in the data.

Please refer to the [credits page](#) for our sources of funding, participating institutions, how to acknowledge the use of SDSS data in your publications. Please also note how to refer to SDSS sources in your publications using the proper [IAU nomenclature for SDSS sources](#).

**Imaging**


**News** University of Portsmouth joins SDSS - acknowledgment updated.  
[More...](#)

**SDSS DR3 Imaging Sky Coverage**  
(Aitoff projection of Equatorial coordinates)



In particular, this includes links to:

- <http://cas.sdss.org> The Catalog Archive Server, for queries on object catalogs, etc.
- <http://das.sdss.org> for bulk downloads of flat files.
- GUI interfaces for downloading finding charts, individual spectra, etc.
- Value-added catalogs of galaxies, quasars, asteroids, clusters, imaging scans through Orion, etc.



# SDSS Data Release 3

Sloan Digital Sky Survey

- Home
- Where to Start
- News and Updates
- Tutorials
- Data Products
- Data Access
- Sky Coverage
- Instruments
- Data Flow
- Algorithms
- Glossary
- Known Problems
- Help and Feedback
- Search

## SDSS data products

### DR3 and other data releases

[About DR3](#) explains the contents of this data release and its relation to other data releases (also see the [SDSS data release schedule](#)).

### Data products overview

#### Images - using SDSS as your telescope

SDSS provides FITS image files of the corrected frames in five bands, a mask that records how each pixel was used in the imaging pipelines, 4 x 4 binned images of the corrected frames after detected objects have been removed, and "atlas" images, which include all significant pixels around each object. This page describes imaging frames, how to get them and related files from the survey archive, and how to work with them.

#### Object lists - using SDSS as your photometric catalog

The calibrated object lists are FITS tables containing positions, fluxes, and shapes of all objects detected at  $>5$  sigma on the images. This page describes the lists, how to get them and related files from the archive, and how to work with them.

#### Spectra and spectroscopic parameters - using SDSS as your spectrograph

- "2d" spectra: FITS files of the flux- and wavelength-calibrated, sky-subtracted spectra, with error and mask arrays and resolution at each pixel. 640 spectra per file.
- "1d" spectra: FITS files with the calibrated spectra and error and mask arrays, redshift, spectral classification, and detected lines of each spectrum.

The page describes calibrated spectra, how to get them and related files from the archive, and how to work with them.

#### Tiling - using SDSS as your complete survey

"Tiling" means optimising the placement of spectroscopic tiles on the sky and assignment of spectroscopic fibers to targets in the spectroscopic survey. This section describes the tiling files, how to get them and related files from the archive, and how to characterise the survey's non-uniformity using them.

#### Other data products

These include astrometric calibrations, photometric calibrations, gif and postscript plots of spectra, and [finding charts](#) in postscript/jpeg/fits formats.

#### Value Added Data Products

The SDSS collaboration has created catalogs and other data products based on public survey data that are of general use.

<http://www.sdss.org/dr3/products/index.html>

## Catalog Archive Server (CAS) Search

### Web interfaces

<a href="#">Catalog Archive Server (CAS)</a>	The Catalog Archive Server for querying the imaging and spectroscopic data.
<a href="#">Spectro Query Server</a>	<b>New:</b> now part of the CAS. Query spectroscopic or photometric parameters.
<a href="#">Imaging Query Server</a>	<b>New:</b> now part of the CAS. Query imaging data by position or by photometric parameters.
<a href="#">SpecList</a>	Upload plate, MJD, fiber list to create a spectroscopic query.
<a href="#">Imaging cross-ID</a>	Find SDSS matches for a spectroscopic object.
<a href="#">SQL search</a>	Directly search the database (also see <a href="#">skyserver help</a> ).
<a href="#">CasJobs</a>	<b>New:</b> Use this batch job system to query the database without restrictions. Set up with your collaborators.
<a href="#">Navigate</a>	Point and click on SDSS objects.
<a href="#">Finding charts</a>	Generate jpeg finding charts for SDSS objects.
<a href="#">Image lists</a>	Get jpeg cutouts of SDSS objects from a finding chart. Option to get raw images.

### Query clients

In addition to using the web interfaces above, you can use the database server to perform your own SQL queries.

<a href="#">sdssQA</a>	Provides GUI to edit and submit SQL queries.
<a href="#">sqlcl</a>	<a href="#">python</a> script to submit SQL queries.
<a href="#">skyserver.el</a>	Submit SQL queries from an emacs.

<http://www.sdss.org/dr3/access/index.html>

User-friendly entrances into the CAS and DAS

#### Data Archive Server (DAS)

The DAS contains

- images of the night sky ("corrected frames") in fits and jpeg format
- calibrated object lists with photometric parameters as fits binary tables
- reduced spectra and spectral parameters as fits binary tables and ps/gf plots

Files and directories within the DAS are designated by survey identifiers of the desired data: `run/rerun/camcol/field` for imaging; `plate/MJD/fiberID` for spectroscopy. The easiest way to obtain this designation is by one of the query forms provided. The DAS is described in detail on the [DAS structure and contents](#) page.

#### Search

<input type="text" value="FOOT DR3"/>	Check whether coordinate is in DR3 for arbitrary (lat of) RA, DEC; if so, retrieve run, rerun, camcol, field, rowc, colc
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#### Retrieve

<a href="#">DAS retrieval form</a>	Use query forms above to obtain survey designation of required data to be uploaded here. Small result sets will be returned as .tar or .zip archive; larger sets can be downloaded using rsync (see <a href="#">rsync help</a> ). The <a href="#">coverage page</a> explains runs, reruns etc.
<a href="#">rsync server</a>	Recommended way for mirroring the DR3 data archive in part or whole. The rsync URL is <code>rsync://dr3@rsync.adaa.org/DR3</code> . See the <a href="#">rsync help</a> page.
<a href="#">http access to DAS</a>	Use your web browser or other http clients like <code>wget</code> . Recommended options for <code>wget</code> to mirror entire directories: <code>--no-host-directories -l inf -r -np --continue</code>
<a href="#">Spectra in bulk</a>	Get all spectroscopic data, or redshift lists by object type (galaxies, quasars, stars)

Last modified: Wed May 26 14:00:05 CDT 2004

Send your questions to [sdss-helpdesk@fas.harvard.edu](mailto:sdss-helpdesk@fas.harvard.edu)

# People are getting to the data!

- Over half of published SDSS papers in recent years are by people from outside the collaboration using the database: essentially no people are publishing wrong results from misunderstanding the data or database.